

## WHAT IS CLAIMED IS:

1. A moving image decoding method of decoding encoded moving image data, which is generated by decomposing each frame of moving image data into a plurality of subbands, and encoding coefficients of the subbands from upper to lower bits for respective bitplanes or sub-bitplanes for each predetermined unit, comprising:
  - a decoding process time information acquisition step of acquiring information used to examine a difference between a time assigned to a decoding process of encoded moving image data for the predetermined unit, and a time required for an actual decoding process;
  - a non-decoding bitplane determination step of determining bitplanes or sub-bitplanes which are not to be decoded on the basis of the information acquired in the decoding process time information acquisition step;
  - a bitplane decoding step of reclaiming the coefficients of the subbands from encoded data of bitplanes or sub-bitplanes other than the bitplanes or sub-bitplanes determined in the non-decoding bitplane determination step; and
  - a subband composition step of generating frame data by compositing the coefficients of the plurality of subbands obtained in the bitplane decoding step.

2. The method according to claim 1, wherein the decoding process time information acquisition step includes a step of acquiring a decoding process time required for the decoding process of the encoded moving  
5 image data, and the non-decoding bitplane determination step includes a step of determining the bitplanes or sub-bitplanes which are not to be decoded on the basis of the decoding process time acquired in the decoding process time information acquisition step.

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3. The method according to claim 1, further comprising:

a decoded frame data storage step of storing the decoded frame data, and

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in that the decoding process time information acquisition step includes a step of acquiring the number of frames stored in the decoded frame data storage step, and the non-decoding bitplane determination step includes a step of determining the  
20 bitplanes or sub-bitplanes which are not to be decoded on the basis of the number of frames acquired in the decoding process time information acquisition step.

4. The method according to claim 1, wherein the  
25 non-decoding bitplane determination step includes a step of managing a parameter indicating image quality, adjusting the parameter on the basis of the information

acquired in the decoding process time information acquisition step, and determining the bitplanes or sub-bitplanes which are not to be decoded of each subband on the basis of the parameter.

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5. The method according to claim 1, wherein the non-decoding bitplane determination step includes a step of managing a table that stores the number of bitplanes or sub-bitplanes which are not to be decoded  
10 of each subband, and increasing/decreasing the number of bitplanes or sub-bitplanes, which are not to be decoded, stored in the table in accordance with the information acquired in the decoding process time information acquisition step.

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6. The method according to claim 2, wherein the non-decoding bitplane determination step includes a step of calculating a difference between a time assigned to a decoding process of the encoded moving  
20 image data of the predetermined unit, and the decoding process time acquired in the decoding process time information acquisition step, and determining the bitplanes or sub-bitplanes which are not to be decoded of each subband on the basis of an accumulated value of  
25 the calculated differences.

7. The method according to claim 1, wherein subband decomposition for generating the encoded moving image data is attained by two-dimensional discrete wavelet transformation, and the subband composition step  
5 includes a step of compositing the frame data using two-dimensional inverse discrete wavelet transformation.

8. The method according to claim 1, wherein the predetermined unit is a frame or a block obtained by  
10 segmenting a frame into a plurality of blocks.

9. A moving image decoding apparatus for decoding encoded moving image data, which is generated by decomposing each frame of moving image data into a  
15 plurality of subbands, and encoding coefficients of the subbands from upper to lower bits for respective bitplanes or sub-bitplanes for each predetermined unit, comprising:

decoding process time information acquisition  
20 means for acquiring information used to examine a difference between a time assigned to a decoding process of encoded moving image data for the predetermined unit, and a time required for an actual decoding process;

25 non-decoding bitplane determination means for determining bitplanes or sub-bitplanes which are not to be decoded on the basis of the information acquired by

said decoding process time information acquisition means;

bitplane decoding means for reclaiming the coefficients of the subbands from encoded data of  
5 bitplanes or sub-bitplanes other than the bitplanes or sub-bitplanes determined by said non-decoding bitplane determination means; and

subband composition means for generating frame data by compositing the coefficients of the plurality  
10 of subbands obtained by said bitplane decoding means.

10. A program that can be executed by an information processing apparatus, having a program code for implementing a moving image decoding method of claim 1.  
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11. A storage medium that can be read by an information processing apparatus, storing a program of claim 10.

20 12. An image decoding method of receiving moving image data, in which images of respective frames have been encoded, and decoding encoded image data of the respective frames, comprising:

a sample frame decoding step of extracting  
25 encoded image data of a sample frame from the respective frames, and decoding the encoded image data using a predetermined decoding unit;

a first measurement step of measuring a time required to decode the encoded image data of the sample frame;

a determination step of determining the number of  
5 decoding units to be decoded so that the time measured in the first measurement step becomes not more than a predetermined time;

a decoding step of decoding encoded image data of the respective frames in accordance with the determined  
10 number of decoding units;

a second measurement step of measuring a time required to decode each frame upon decoding the frame in the decoding step;

an update step of accumulating a difference  
15 between the predetermined time and the time measured in the second measurement step every time the frame is decoded, and updating the number of decoding units determined in the determination step when the accumulated value becomes not less than a predetermined  
20 value; and

in that the decoding step includes a step of decoding the encoded image data of each frame in accordance with the number of decoding units determined in the determination step or the number of decoding  
25 units updated in the update step.

13. The method according to claim 12, further comprising:

a third measurement step of measuring a time required to decode each decoding unit upon decoding the encoded image data of the sample frame in the sample frame decoding step, and

in that the determination step includes a step of:

determining, when the time measured in the first measurement step is larger than the predetermined time, the number of decoding units to be decoded by subtracting the decoding time required to decode each decoding unit measured in the third measurement step from the time measured in the first measurement step, and determining the number of non-decoding decoding units, which is specified by arranging all decoding units that form one frame in a predetermined order and counting the arranged all decoding units, on the basis of the number of times of subtraction of the time measured in the third measurement step from the time measured in the first measurement step, when the difference becomes not more than the predetermined value.

14. The method according to claim 12, wherein the determination step includes a step of determining

decoding units which are to be or not to be decoded of  
decoding units which form one frame.

15. The method according to claim 12, wherein the  
5 update step includes a step of increasing, when the  
accumulated value becomes not less than a predetermined  
value, the number of decoding units determined in the  
determination step.

10 16. The method according to claim 12, further  
comprising a step of:

storing data of a table in which a plurality of  
different sets of values of a parameter associated with  
image quality and the numbers of decoding units to be  
15 decoded are registered in a memory, and

in that the sample frame decoding step includes a  
step of executing the decoding process of the encoded  
image data of the sample frame using the parameter for  
different parameter values by changing the parameter  
20 value,

the first measurement step includes a step of  
measuring decoding times in the sample frame decoding  
step for respective parameter values, and

the determination step includes a step of:  
25 subtracting, when a first time measured in the  
first measurement step is larger than the predetermined  
time upon decoding the sample frame using a



- predetermined parameter value in the sample frame decoding step, a difference between neighboring times from the first time in each decoding time, determining the parameter value based on the number of times of subtraction when the difference becomes not more than the predetermined value, and determining the number of decoding units to be decoded corresponding to the determined parameter value with reference to the table.
- 10 17. The method according to claim 16, wherein the update step includes a step of increasing, when the accumulated value becomes not less than the predetermined value, the parameter value determined in the determination step, and increasing the number of decoding units with reference to the data of the table.
- 15 18. The method according to claim 16, wherein the parameter associated with image quality is a Q factor.
- 20 19. The method according to claim 12, wherein the decoding unit includes one of a bitplane and sub-bitplane.
- 25 20. The method according to claim 12, comprising a step of holding images of respective frames decoded in the decoding step for a predetermined number of frames, and outputting the decoded images of the frames to a

display apparatus that makes display at a predetermined frame rate at a predetermined time interval according to the frame rate.

- 5    21.    An image decoding apparatus for receiving moving image data, in which images of respective frames have been encoded, and decoding encoded image data of the respective frames, comprising:

sample frame decoding means for extracting  
10    encoded image data of a sample frame from the respective frames, and decoding the encoded image data using a predetermined decoding unit;

first measurement means for measuring a time  
required to decode the encoded image data of the sample  
15    frame;

determination means for determining the number of decoding units to be decoded so that the time measured by said first measurement means becomes not more than a predetermined time;

20        decoding means for decoding encoded image data of the respective frames in accordance with the determined number of decoding units;

second measurement means for measuring a time  
required to decode each frame upon decoding the frame  
25    by said decoding means; and

update means for accumulating a difference  
between the predetermined time and the time measured by

said second measurement means every time the frame is  
decoded, and updating the number of decoding units  
determined by said determination means when the  
accumulated value becomes not less than a predetermined  
5 value, and

in that said decoding means decodes the encoded  
image data of each frame in accordance with the number  
of decoding units determined by said determination  
means or the number of decoding units updated by said  
10 update means.

22. A program making a computer implement an image  
decoding method of claim 12.

15 23. A computer readable storage medium storing a  
program of claim 22.